

WHAT IS CLAIMED IS:

1. A handle having a torque limiter usable in a device having an operating mechanism (5) moving vertically according to the rotation of a handle element (6), the handle element (6) comprising:
  - 5 a cover portion (61) configured to move down by being rotated and stop at the predetermined lowest position;
  - a handle body (62) disposed inside said cover portion and having a lower portion that is connected to said operating mechanism;
  - said cover portion (61) comprising:
    - 10 receiving holes (61a) disposed therein;
    - elastic bodies (7) inserted in said receiving holes (61a) for pushing down said operating mechanism (5);
    - a transmitting member (8) disposed at one end of said elastic bodies for transmitting the pushing force of said elastic
    - 15 bodies to said handle body;
  - wherein said elastic bodies push down said operating mechanism (5) with a minimum pushing force to obtain desired effect when said cover portion reaches said predetermined lowest position;
  - said handle body having on its upper surface a ring-shaped concave
  - 20 portion (62) for engaging therein a transmitted member (10) to which the bottom surface of said transmitting member is pressed,
  - wherein said transmitted member has a serration on its surface facing said transmitting member or said transmitting member has a serration on its surface facing said transmitted member;
  - 25 said serration comprises inclined surfaces (81, 101) and vertical surfaces (82, 102) that are alternately arranged in a circumferential

direction; and

said inclined surfaces are tilted upwardly along the direction in which said cover portion is rotated to move down.

2. A handle having a torque limiter usable in a device having  
5 an operating mechanism (5) moving vertically according to the  
rotation of a handle element (6), the handle element (6) comprising:  
a cover portion (61) having a lower portion that is connected to said  
operating mechanism and configured to move down by being rotated  
and stop at the predetermined lowest position;  
10 a handle body (62) disposed inside said cover portion;  
said handle body comprising:

receiving holes (61a) disposed therein;  
elastic bodies (7) inserted in said receiving holes (61a) for  
pushing down said operating mechanism (5);  
15 a transmitting member (8) disposed at one end of each of said  
elastic bodies for transmitting the pushing force of said  
elastic bodies to said handle body;

wherein said elastic bodies push down said operating mechanism (5)  
with a minimum pushing force to obtain desired effect when said cover  
20 portion reaches said predetermined lowest position;

said cover portion having therein a ring-shaped concave portion  
(62a) opening downwardly, said concave portion engaging therein a  
transmitted member (10) to which the upper surface of said transmitting  
member is pressed,

25 wherein said transmitted member has a serration on its surface  
facing said transmitting member or said transmitting member has a

serration on its surface facing said transmitted member;

said serration comprises inclined surfaces (81, 101) and vertical surfaces (82, 102) that are alternately arranged in a circumferential direction; and

5        said inclined surfaces are tilted upwardly along the direction in which said cover portion is rotated to move down.

3.        A fluid controller (1) comprising:

valve casing (2) having fluid channel (21) therein;

valve membrane (3) for opening and closing said fluid channel;

10        an operating mechanism (5) having a lower end that is connected to the upper side of said valve membrane;

a handle element (6) for vertically moving said operating mechanism; said handle element comprising:

15        a cover portion (61) configured to move down by being rotated and stop at the predetermined lowest position;

a handle body (62) disposed inside said cover portion (61) and having a lower portion that is connected to said operating mechanism;

said cover portion comprising:

20        receiving holes (61a) disposed therein;

elastic bodies (7) inserted in said receiving holes (61a) for pushing said operating mechanism (5) downwardly;

a transmitting member (8) disposed at one end of said elastic bodies for transmitting the pushing force of said elastic

25        bodies to said handle body;

wherein said elastic bodies push down said operating mechanism (5)

with a minimum pushing force to obtain desired effect when said cover portion reaches said predetermined lowest position;

said handle body having on its upper surface a ring-shaped concave portion (62) for engaging therein a transmitted member (10) to which the  
5 bottom surface of said transmitting member is pressed,

wherein said transmitted member has a serration on its surface facing said transmitting member or said transmitting member has a serration on its surface facing said transmitted member;

said serration has inclined surfaces (81, 101) and vertical surfaces  
10 (82, 102) that are alternately arranged in a circumferential direction; and

said inclined surfaces are tilted upwardly along a direction in which said cover portion is rotated to move down.

4. A fluid controller (1) comprising:  
valve casing (2) having fluid channel (21) therein;  
15 valve membrane (3) for opening and closing said fluid channel;  
an operating mechanism (5) having a lower end that is connected to the upper side of said valve membrane;  
a handle element (6) for vertically moving said operating mechanism; said handle element comprising:

20 a cover portion (61) configured to move down by being rotated and stop at the predetermined lowest position;  
a handle body (62) disposed inside said cover portion (61) and having a lower portion that is connected to said operating mechanism;

25 said handle body comprising:  
receiving holes (61a) disposed therein;

elastic bodies (7) inserted in said receiving holes (61a) for pushing said operating mechanism (5) downwardly;

a transmitting member disposed at one end of each of said elastic bodies for transmitting the pushing force of said elastic bodies to said handle body;

wherein said elastic bodies push down said operating mechanism (5) with a minimum pushing force to obtain desired effect when said cover portion reaches said predetermined lowest position;

said cover portion having therein a ring-shaped concave portion (62a) opening downwardly, said concave portion engaging therein a transmitted member (10) to which the upper surface of said transmitting member is pressed,

wherein said transmitted member has a serration on its surface facing said transmitting member or said transmitting member has a serration on its surface facing said transmitted member;

said serration has inclined surfaces (81, 101) and vertical surfaces (82, 102) that are alternately arranged in a circumferential direction; and

said inclined surfaces are tilted upwardly along a direction in which said cover portion is rotated to move down.

5. A fluid controller according to either claim 3 or 4,

wherein said transmitting member having on its surface facing said transmitted member a serration in which inclined surfaces (81) and vertical surfaces (82) are alternately arranged in a circumferential direction;

wherein said transmitted member having on its surface facing said transmitting member a serration in which inclined surfaces (81) and vertical surfaces (82) are alternately arranged in a circumferential

direction; and

each of said inclined surfaces of said transmitted member is arranged to be pressed to one of said inclined surfaces of said transmitting member.

5           6.       A fluid controller according to either claim 3 or 4,

wherein said transmitting member comprises a plurality of transmitting pieces having a circular surface facing said transmitted member;

10           said transmitting pieces are arranged along the circumferential direction of said transmitted member; and

each of said circular surface is configured to be pressed to one of said inclined surfaces of said transmitted member.

7.       A fluid controller according to either claim 3 or 4,

15           wherein said transmitted member comprises a plurality of transmitted pieces having a circular surface facing said transmitting member;

said transmitted pieces are arranged along the circumferential direction of said transmitting member; and

20           each of said circular surface are arranged to be pressed to one of said inclined surfaces of said transmitting member.

8.       A fluid controller according to either claim 6 or 7,

wherein either said plurality of transmitting pieces or said plurality of transmitted pieces has a spherical shape.

9.       A fluid controller according to either claim 3 or 4,

25           wherein said receiving holes are configured as a ring-shaped groove;  
and

said elastic bodies comprise springs having the same diameter as  
said ring-shaped groove.